

Remarks

Entry of the above-noted amendments, reconsideration of the application, and allowance of all claims pending are respectfully requested. By this amendment, claims 1, 4, and 25 are amended. These amendments to the claims constitute a bona fide attempt by applicant to advance prosecution of the application and obtain allowance of certain claims, and are in no way meant to acquiesce to the substance of the rejections. Support for the amendments can be found throughout the specification (e.g., page 3, lines 13-20; page 5, line 24 to page 6, line 15), figures (e.g., FIGS. 1-2), and claims and thus, no new matter has been added. Claims 1-25 are pending.

Claim Rejections - 35 U.S.C. § 103

Claims 1-25 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Vengsarkar (U.S. Patent No. 5,430,817) in view of Orthonos et al. (Artech House, Inc., 1999; "Orthonos") and in further view of Goldberg et al. (U.S. Patent No. 6,731,837; "Goldberg") and Michal et al. (U.S. Patent No. 6,025,915; "Michal"). This rejection is respectfully, but most strenuously, traversed.

Applicant respectfully submits that the Office Action's citations to the applied references, with or without modification or combination, assuming, *arguendo*, that the modification or combination of the Office Action's citations to the applied references is proper, do not teach or suggest one or more elements of the claimed invention, as further discussed below.

For explanatory purposes, applicant discusses herein one or more differences between the Office Action's citations to the applied references and the claimed invention with reference to one or more parts of the applied references. This discussion, however, is in no way meant to acquiesce in any characterization that one or more parts of the Office Action's citations to the applied references correspond to the claimed invention.

Applicant respectfully submits that the Office Action's citations to the applied references do not teach or suggest one or more elements of the claimed invention. A careful reading of the Office Action's citations to the applied references fails to teach or suggest, for example, the amplification fiber that absorbs a subset of the one or more pump optical signals and emits one or more output signals toward the light source; wherein the long period Bragg grating attenuates the one or more output signals, as recited in applicant's independent claim 1.

Vengsarkar (column 3, lines 22-47; FIG. 5) discloses a long period spectral shaping device to remove unused pump energy:

FIG. 5 illustrates an optical transmission system 50 using a long period spectral shaping device to remove unused pump energy. Specifically, the system 50 comprises a transmitter source 51 of optical signals such as a digitally modulated 1.55 μm signal, an optical signal path comprising a length of optical fiber 52 for transmitting the signal, and a receiver 53 for receiving and demodulating the signal. An optical amplifier such as an erbium-doped fiber amplifier 54 is disposed in the optical signal path for amplifying the transmitted signal. The amplifier is pumped by pump sources 55, 56 of optical energy of pump wavelengths λ_{p1} and λ_{p2} . Unused pump energy of each pump wavelength will pass through amplifier 54. The energy is advantageously removed from the system so that it will not deteriorate the performance of the pump sources 55, 56 and transmission and receiving equipment 51, 53. To remove unused pump energy, a long period spectral shaping device 57 is disposed in the path of the energy from pump 55 after it has passed through amplifier 54. Specifically, in the dual-pumped laser of FIG. 5, device 57 has its spacing Λ chosen to remove energy of wavelength λ_{p1} . A second long period grating 58 has its spacing chosen to remove energy of wavelength λ_{p2} . In a typical application, λ_s is 1.55 μm , λ_{p1} is 9.780 μm and λ_{p2} is 9.840 μm .

Vengsarkar discloses removal of unused *pump energy*, for example, pump energy of wavelength λ_{p1} and λ_{p2} , by the devices 57 and 58, respectively. Vengsarkar fails to disclose removal of *output energy* from the amplifier 54, for example, output energy of wavelength λ_s , through employment of a long period Bragg grating. The pump source 56 disclosed in FIG. 5 is

coupled with the amplifier 54 via a pigtail configuration. The pigtail configuration requires the use of a wavelength division multiplexer to couple the pump energy to the optical fiber 52 for transmission to the amplifier 54. The wavelength division multiplexer increases cost and complexity of manufacture of the optical transmission system 50. Removal of the wavelength division multiplexer and optically coupling the pump source 56 with the amplifier 54 via an optical splice would cause reverse light (described below) directed towards the pump source 56 to reflect (e.g., backreflection) off the pump source 56 and cause an undesirable oscillation within the optical transmission system 50. Simply missing from the Office Action's citation to Vengsarkar is any mention of the amplification fiber that absorbs a subset of the one or more pump optical signals and emits one or more output signals toward the light source; wherein the long period Bragg grating attenuates the one or more output signals, as recited in applicant's independent claim 1.

So, the Office Action's citation to Vengsarkar fails to satisfy at least one of the limitations recited in applicant's independent claim 1.

The shortcomings of the Office Action's citation to Vengsarkar relative to certain elements of the claimed invention have been discussed above. The Office Action proposes a combination of the citation to Vengsarkar with a citation to Michal. However, the Office Action's citation to Michal does not overcome the deficiency of the Office Action's citation to Vengsarkar. Applicant respectfully submits that the proposed combination of the Office Action's citation to Vengsarkar with the Office Action's citation to Michal fails to provide the required approach, assuming, *arguendo*, that the combination of the Office Action's citation to Vengsarkar with the Office Action's citation to Michal is proper.

Michal (column 4, lines 38-44) discloses that the gain fiber absorbs pump light and emits light in both directions in the gain fiber, as will be understood by those skilled in the art:

The gain fiber 218 absorbs part of the pump light and emits light propagating lengthwise in both directions in the gain fiber. Light emitted in the direction of propagation of the pump light is referred to as forward light. Light emitted by the gain fiber 218 in the direction opposite to the direction of propagation of the pump light is referred to as reverse light.

The gain fiber emits light, for example, output energy, in both directions. If output energy from the amplifier (gain fiber) reaches the light source (i.e., pump source 56 of Vengsarkar and pump light source 206 of Michal), the output energy will be backreflected and cause the undesirable oscillation. Michal (column 4, lines 16-23; FIG. 5) discloses the use of a wavelength division multiplexer between the light source and the amplifier to guide the pump light to the gain fiber:

A WDM coupler 210 has optical pigtails 212-215 extending therefrom. The pigtail 212 is connected to optical fiber 208 via a splice 216, so that the pump light propagates from the pump light source 206 to the WDM coupler 210. The WDM coupler 210 guides the pump light into a gain fiber 218 that is connected end-to-end with the optical fiber pigtail 215 via a splice 220.

Michal (column 4, lines 60-65; FIG. 5) discloses that the WDM coupler guides the light emitted from the gain fiber (i.e., the output energy) to an optical component, for example, the fiber optic gyroscope:

The WDM coupler 210 directs the light emitted from the gain fiber 218 to the fiber optic gyroscope 204 via optical fiber 224 that is connected to optical pigtail 213 via splice 226. The light that the optical fiber 224 guides away from the WDM coupler 210 is the optical signal for the fiber optic gyroscope 204.

Michal discloses that the WDM coupler guides the output energy to reduce backreflection. The wavelength division multiplexer increases cost and complexity of

manufacture of the optical transmission system 50. Removal of the WDM coupler would allow the reverse light to backreflect off the pump light source 206 and cause the undesirable oscillation. Simply missing from the Office Action's citation to Michal is any mention of the amplification fiber that absorbs a subset of the one or more pump optical signals and emits one or more output signals toward the light source; wherein the long period Bragg grating attenuates the one or more output signals, as recited in applicant's independent claim 1.

So, the Office Action's citation to Michal fails to satisfy at least one of the limitations recited in applicant's independent claim 1.

The shortcomings of the Office Action's citations to Vengsarkar and Michal relative to certain elements of the claimed invention have been discussed above. The Office Action proposes a combination of the citations to Vengsarkar and Michal with a citation to Orthonos. However, the Office Action's citation to Orthonos does not overcome the deficiency of the Office Action's citation to Vengsarkar and Michal. Applicant respectfully submits that the proposed combination of the Office Action's citation to Vengsarkar and Michal with the Office Action's citation to Orthonos fails to provide the required approach, assuming, *arguendo*, that the combination of the Office Action's citation to Vengsarkar and Michal with the Office Action's citation to Orthonos is proper.

Orthonos discloses known characteristics of long period Bragg gratings. Simply missing from the Office Action's citation to Orthonos is any mention of the amplification fiber that absorbs a subset of the one or more pump optical signals and emits one or more output signals toward the light source; wherein the long period Bragg grating attenuates the one or more output signals, as recited in applicant's independent claim 1.

So, the Office Action's citation to Orthonos fails to satisfy at least one of the limitations recited in applicant's independent claim 1.

The shortcomings of the Office Action's citations to Vengsarkar, Michal, and Orthonos relative to certain elements of the claimed invention have been discussed above. The Office Action proposes a combination of the citations to Vengsarkar, Michal, and Orthonos with a citation to Goldberg. However, the Office Action's citation to Goldberg does not overcome the deficiency of the Office Action's citations to Vengsarkar, Michal, and Orthonos. Applicant respectfully submits that the proposed combination of the Office Action's citations to Vengsarkar, Michal, and Orthonos with the Office Action's citation to Goldberg fails to provide the required approach, assuming, *arguendo*, that the combination of the Office Action's citations to Vengsarkar, Michal, and Orthonos with the Office Action's citation to Goldberg is proper.

Goldberg discloses fusion splicing for low loss coupling of optical fiber. Simply missing from the Office Action's citation to Goldberg is any mention of the amplification fiber that absorbs a subset of the one or more pump optical signals and emits one or more output signals toward the light source; wherein the long period Bragg grating attenuates the one or more output signals, as recited in applicant's independent claim 1.

So, the Office Action's citation to Goldberg fails to satisfy at least one of the limitations recited in applicant's independent claim 1.

Furthermore, the Office Action does not allege that the art of record provides any teaching, suggestion, or incentive for modifying the citations to Vengsarkar, Michal, Orthonos and/or Goldberg to provide the claimed configuration.

For all the reasons presented above with reference to claim 1, claim 20 is believed neither anticipated nor obvious over the art of record. The corresponding dependent claims are believed

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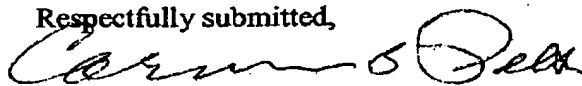
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allowable for the same reasons as independent claim 1, as well as for their own additional characterizations.

Withdrawal of the § 103 rejection is therefore respectfully requested.

In view of the above amendments and remarks, allowance of all claims pending is respectfully requested. If a telephone conference would be of assistance in advancing the prosecution of this application, the Examiner is invited to call applicant's attorney.

Respectfully submitted,



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